

CLAIMS

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1. ~~Light modulating apparatus comprising an array of light modulating pixels~~  
and drive means adapted to drive the array to write a complete image by a weighted  
bit plane technique in response to an image signal representing a set of  $n$ -digit binary  
5 numbers defining the intended intensities of respective pixels of the array,  $n$  being an  
integer greater than one,  
characterised in that the pixels are liquid crystal pixels, and the driving means  
is arranged to alter the  $n$ -digit number in respect of at least one said pixel to a closely  
adjacent value so that the numbers of 1s and 0s written thereat over said writing of a  
10 complete image are brought closer to equality whereby to improve the dc balance.
2. Light modulating apparatus comprising an array of light modulating pixels  
and drive means adapted to drive the array to write a complete image by a weighted  
bit plane technique in response to an image signal representing a set of  $n$ -digit binary  
numbers defining the intended intensities of respective pixels of the array,  $n$  being an  
15 integer greater than one,  
characterised in that the pixels are liquid crystal pixels, and over a plurality of  
successive said complete images the driving means is arranged to alter the  $n$ -digit  
number in respect of at least one said pixel in at least one said complete image to a  
closely adjacent value so that the numbers of 1s and 0s written at said at least one said  
20 pixel over the plurality of images are brought closer to equality whereby to improve  
the dc balance.
3. Display apparatus according to claim 2 wherein said driving means is arranged  
so that values of said number over said plurality of images provide an average  
intensity at said at least one pixel substantially equal to the intended intensity.
- 25 4. Display apparatus according to claim 2 or claim 3 wherein said plurality of  
images is two or four images.
5. Display apparatus according to any preceding claim wherein said driving  
means is arranged so that said numbers of 1s and 0s written at said at least one said  
pixel are brought to equality

6. Display apparatus according to any preceding claim wherein said driving means includes a look-up table for determining how said at least one number is to be altered.

7. Display apparatus according to any preceding claim wherein said driving means is arranged so that at least the weighted bit plane corresponding to the most significant digit of the numbers in said set is refreshed during the writing of said complete image.

8. Display apparatus according to claim 7 wherein said driving means is arranged so that a plurality m of the weighted bit planes corresponding to a like plurality of the most significant digits of the numbers in said set are refreshed during the writing of a complete image, where m is a positive integer at least 2 lower than n, and said driving means includes a memory and means for storing in said memory signals for the first plurality of bit planes as a corresponding first plurality of binary strings in sequential locations in said memory in decreasing order of significance of said significant digits, the drive means further including means arranged to make a succession of read cycles from the stored strings, each read cycle consisting of reading one or more of the stored strings in sequence as stored, commencing with the string for said most significant digit, the numbers of the strings read in the read cycles being varied so that at the end of the said succession of read cycles each string of the first plurality has been read out a plurality of times proportional to the exponent of its associated digit.

9. Display apparatus according to claim 8 wherein said storing means is arranged to store all of the bit plane signals as strings in sequential locations in said memory in decreasing order of significance of the associated digit.

10. Display apparatus according to claim 8 or claim 9 wherein said driving means is arranged to write bit planes not in said plurality once per said succession for periods determined by the exponents of their associated digits.

11. Display apparatus according to any preceding claim and including means for applying a small ac potential difference to pixels of the array in periods when bit planes are not being written to prolong the display.

12. A method of image signal processing for a weighted bit plane technique, in which an image signal represents a set of n-digit binary number signals each indicative of the intended intensity level of a respective one of a corresponding array of binary pixels, wherein at least one said binary number has an inequality of 1s and 0s, characterised in that said method comprises the step of altering the said at least one binary number to a closely adjacent value to reduce or remove the said inequality therein and so that any inequality of 1s and 0s in each of the rest of the said set of numbers is left unchanged, reduced or removed.

13. A method of writing and displaying an image in response to an image signal representing a set of n-digit binary numbers each indicative of the intended intensity level of a respective one of a corresponding array of binary pixels, a complete image being written using a weighted bit plane technique, the method being characterised in that at least one said binary number is altered to a closely adjacent value such that over the writing of said complete image an inequality of 1s and 0s at the corresponding pixel is reduced or removed and so that any inequality of 1s and 0s at pixels for each of the rest of the said set of numbers is left unchanged, reduced or removed.

14. A method of writing and displaying an image in response to an image signal representing a set of n-digit binary numbers each indicative of the intended intensity level of a respective one of a corresponding array of binary pixels, using a weighted bit plane technique, wherein at least one binary number produces an inequality of 1s and 0s at its pixel over the writing of a complete image, characterised in that a plurality of images each approximating said complete image are written in succession, and the said at least one binary number is altered to a closely adjacent value in at least one of said plurality of images so that over said succession the said inequality of 1s and 0s is reduced or removed and any inequality of 1s and 0s at each of the other pixels is left unchanged, reduced or removed.

15. A method according to claim 13 or claim 14 wherein at least one bit plane is refreshed during the writing of a said complete image.